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The EXTENSION ENTOMOLOGIST

Just recently Dr. L. O. Howard's attention was called to an address he gave in 1925, and referring to the following excerpt, he stated, "I am of the same opinion still and feel certain that we will never have too many people interested in entomology:"

"... Here, obviously, is an opportunity for the stressing of the duty of teachers to include work in entomology, and the representative committee in charge of this subject should add an entomologist to its members as a preliminary step to the securing, not only in high schools, but in secondary schools as well, of such instruction in entomology as will arouse the interest of boys and girls in entomology and make them realize its enormous importance."

"With the education of the public should come (and I hope it will) a great increase in the number of so-called amateur entomologists. We all know that men of this class have done magnificent work in the past; that in fact they did the bulk of the work down to comparatively recent years...."

M. P. Jones.
Extension Entomologist.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND
EXTENSION SERVICE, COOPERATING

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CONTENTS

INTRODUCTION

The quotation on the cover is from Dr. Howard's excellent address on "The Needs of the World as to Entomology," given in the 1925 Smithsonian Report, pages 355 to 372.* It is to be regretted that space will not permit reproducing the entire article as it outlines so clearly many of the things extension entomologists are trying to do. There are many more entomologists of the same opinion as Dr. Howard.

As the need for informing the public entomologically is just as great today, there is no better place to start than with juniors. Camp season will soon be in full swing and since it affords an excellent opportunity to call the club members' attention to insects from both the economic and aesthetic standpoint, we should avail ourselves of every opportunity to give such personal assistance as is possible and prepare material which others can use.

Referring again to Dr. Howard--sometime ago I sent him a copy of my 4-H circular on insects, and his reply was, "I don't know as much as I wish I did about your farm boys and girls movement, but I think it very fine and very much worth while. I wish I had had your pamphlet when I was a boy. It would have been a great help, and in fact a treasure.

Think of the boys and girls today who correspond to Dr. Howard 65 years ago and who would welcome a bulletin or circular to guide them in working with insects! Let us not fail to use this opportunity to keep the public abreast of us in our profession, and incidentally, keep ours abreast of other professions.

In this issue are a number of articles explaining how adult agencies are being used to help entomologists reach the public at large with unbiased entomological information.

PERSONNEL

Iowa.--Dr. H. D. Tate, of the Bureau of Entomology and Plant Quarantine, located in Puerto Rico, has been selected to succeed Mr. A. D. Worthington as extension entomologist, effective April 15.

According to Doctor Drake, Mr. Ellis A. Hicks has been appointed wildlife specialist in the Extension Division of the College. Doctor Tate and Mr. Hicks will work very closely together in order to correlate the entomological and wildlife activities in the Extension Service.

Dr. G. C. Decker, assistant extension entomologist, is on leave to assist with the grasshopper control campaign and is located in Minneapolis, Minn.

Washington.--Mr. L. G. Smith was appointed extension entomologist effective March 1, 1938.

Idaho.--Dr. Claude Wakeland, of Idaho, is on leave to take charge of the Mormon cricket control project and is located at Salt Lake City, Utah.

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*Reprinted from Annals of the Entomological Society of America, vol. 18, No. 1, 1925.

SOURCE OF MATERIAL

At the Cotton States Branch Entomologists Meeting, Dr. W. E. Dove, as chairman, presented a most interesting address on "The County Agent and Applied Entomology." It is interesting to read the attitude toward county agent work and insect pest control from the standpoint of an entomologist not attached to the Extension Service.

Just recently my attention was called to two articles appearing in the Southeastern Drug Journal. These articles show that druggists are becoming conscious of the benefits derived from closer cooperation with entomologists. Since these articles are along the line of extension teaching methods, they are being reproduced herewith.

Following the issuance by the Bureau of Entomology and Plant Quarantine of an article on a simple method of treating green posts, Mr. Nettles of South Carolina consented to prepare an article on the way he is applying this information, which is so vital to farmers in his State.

Mr. Dibble responded to my request for material and has prepared two short articles setting forth his methods of approach to two problems in Michigan--one on the cabbage maggot, and the other on the use and distribution of a livestock insect pest calendar.

Dr. F. Z. Hartzell, Geneva, N. Y., has compiled a table on the cost of spring treatments through delayed dormant stage. With his permission, it is being copied for your information.

SPECIAL ARTICLES

The County Agent and Applied Entomology

By Dr. W. E. Dove
Bureau Entomology and Plant Quarantine

The county agricultural agent promotes the best interests of agriculture and is concerned primarily with the adoption of improved and profitable methods of producing crops and livestock. In addition to his regular projects, he is called upon to advise on a variety of subjects, such as soils to be cultivated, their preparation for planting, the seed to be used, the fertilizers, the manner of cultivation, the methods of harvesting, and the marketing of produce. He is consulted on the selection of breeding animals, the feeding, the care, and the marketing of livestock. Frequently he is requested to give information on the construction of silos, poultry houses, hog houses, structures for handling animals, and places for storage of food grown on the farm. He answers these questions with practical recommendations, realizing that the success of his promotional program depends upon the will and ideals of the individual farmer. When it is possible, he arouses the farmer's ambition, energizes his will, and awakens his pride, so that there will be more opportunity to secure adoption of improved methods.

In the production of various crops and different kinds of livestock and in the maintenance of the farm home there are always demands for information on practical methods of controlling various insect pests. The county agent could not easily escape them if he chose to do so. The farmer's home, its furnishings, the food stored for use of the farmer and his livestock, each kind of domestic animal, and each crop grown are subject to losses by different insect pests. Regardless of the nature of the projects assigned to the county agent, he is confronted with the problem of advising on methods of controlling these pests. He is considered the local authority on all matters relating to the farm and is expected to know what to recommend. Just how well he does the job for each pest depends not altogether upon how carefully the control procedures are worked out by the entomologist, but also upon the fact that the insect has created a real problem in the county, how well the entomologist sells the county agent on the recommended methods, and how much additional assistance to the county agent is given in selling the methods to the farmer. Before an agent can effectively sell the farmer on the practice, it is necessary for him to be thoroughly sold on the purposes, procedures, and the probable results, and to be furnished with convincing literature which the farmer can understand.

The services of the county agent might be compared to those of a local hardware dealer, who also sells a service to aid in the production of crops, the raising of livestock, and for comforts and conveniences of the home. The latter merchandises plows, tools, tractors, mowing machines, hay presses, grinders, binders, and threshing machines for crops; wire, gates, stanchions, harness, rope, and vehicles for use with livestock; and gas engines, stoves, furnaces, washing machines, cutlery, and various mechanical appliances for the home. His knowledge of the local needs and his confidence in the manufacturer serve as the basis for his stocks of merchandise. If he receives assistance in selling the merchandise as a service and with a profit to himself, he maintains confidence in the manufacturer and continues to do business with him. For unusual items or those requiring the larger investments, he is furnished special aids in selling which include attractive circulars and broadsides, well illustrated and prepared in a simple language, carefully prepared material including mats for use in newspaper advertising, and is assisted in special demonstrations. The manufacturer participates in sales campaigns and demonstrations for the benefit of the public, the dealer, and his business. Occasionally the dealer visits the factory and receives additional assistance from specialists who are thoroughly familiar with the construction of special equipment, with the fine points of selling, and the values of the services to be obtained from the merchandise. The hardware dealer's business is based on service, on confidence, on a realization that the manufacturer and the dealer are dependent upon each other, and upon the fact that both the dealer and the manufacturer are dependent upon the services of goods sold to the public.

Both the county agent and the hardware dealer depend upon the products of research work. Both the manufacturer and the scientific research workers depend upon dealers or county agents to sell their products successfully to the people. The county agent depends upon the entomologist for practical methods of combatting insects; the entomologist depends upon the county agent to sell these methods at the time they will be most effective; the entomologist

depends upon fellow entomologists for cooperation and specialized assistance; and, the entomologist and other specialists in the general field of agriculture depend upon one another.

The county agent depends upon the entomologist because he receives all sorts of inquiries from farmers and it is impossible for him to give satisfactory replies to all of the questions. He anticipates some of the more important ones and attempts to fortify himself with information to fill the most urgent demands, either by use of literature or by visits to the experiment station. His inquiries on control of insect pests usually require prompt attention, and if he does not have the information in convenient and understandable form, it is necessary for him to obtain it from an entomologist. If the desired information is not available, he reports on the need for it in his county and depends upon the entomologist for assistance in the future. On the other hand, the entomologist depends upon the county agent because he needs timely information on the occurrence of destructive insect pests. He may receive letters from individuals, but if the demand for help is urgent among several farmers, he expects the county agent to report it to him and to send specimens for identification. Since the seriousness of a pest varies in different counties and the specific recommendations worked out for one county may not entirely apply to different conditions in other counties, the entomologist depends to some extent upon the county agent to bring this to his attention. If the recommendations are applicable, the entomologist depends upon the active support of the agent in establishing their uses among farmers.

Entomologists realize fully that they are dependent upon one another for aid. The occurrence of serious insect pests in different States during each year has resulted in close cooperation among them. Their common interests and their cooperative efforts have been essential to the progress made in controlling the pests.

On account of the relationship of insects and their hosts and the needs for coordinated planning in general programs for improved methods, the specialists in agriculture are mutually dependent upon one another. For example, the production of commodities to meet seasonal demands for certain crops and for certain meats are important problems to agronomists and animal husbandmen. But factors entering into the time of planting, the manner of cultivating crops, the regulated birth of young animals, and the care of animals affect the abundance of noxious insects. Both the agronomist and the animal husbandman are obliged to synchronize their recommendations with those for control of insect pests in order to more profitably grow crops or raise livestock. This means that the work of the entomologist is governed to some extent by seasonal demands for produce, by the methods of production to meet those demands, and by the work of other specialists in agriculture. The work of another group of specialists, that concerned with diseases of animals and plants, is affected by the transmission of certain diseases by insects. Such workers depend upon the cooperation of the entomologist in order to determine effective methods of controlling the diseases by controlling insect vectors. On the other hand, the entomologist depends upon the pathologist for information and must take into consideration the behavior of the disease organism in order to devise effective control procedures.

The public expects the entomologist to work out and introduce effective methods of controlling insect pests, and the entomologist is becoming more interested in securing the adoption of recommended procedures. One tendency is to secure more cooperation of specialists in related fields in using insect-control methods as leverage to accomplish the fundamental principles they are trying to get into practice. Another tendency is to publish essential information in simple language that the farmer can understand and to make it readily available. Another trend is the increased use of newspapers for timely items on the occurrence of pests and the necessary steps for control of different destructive insect pests. Another tendency is to enlist local dealers to stock desirable insecticides so that they may be available when needed. Another tendency is to more freely advise the use of responsible pest control operators for control of pests of the home and farm. These steps indicate a trend toward filling the demand for a better understanding of elementary or secondary entomology, but not a tendency to omit the desires of the smaller numbers of men who require information of a more advanced nature. If we continue to proceed in this direction, we should be able to avoid the two common kinds of poverty: lack of goods to fill the higher wants and lack of wants for the higher goods.

The mutual dependency of different agricultural specialists and the need for coordinating varied interests for the benefit of the public necessarily lead to cooperative work with the county agricultural agent. If entomologists are to pursue more profitably the needed lines of research, would it not be advisable for them to work with different county agents and learn of their local needs in applied entomology? The agents are in touch with farmers constantly and their ideas represent a cross section of the ideas of farmers. Would not a perspective from several such cross sections enable us to more adequately meet local demands for research and control of insect pests? How can we secure more confidence of the agent and the farmers so that we may work with them more effectively? Simply by keeping these thoughts in mind:

1. Do not know too much.

The average man is not interested in your college life, how many degrees you have, or how many societies you belong to. He cares but little about where you have been or what you may have seen there.

2. Be willing to work.

Convince people that you know what you are doing by doing, as well as by talking. Sell your control methods by showing farmers how as well as by telling them how.

3. Meet people on a common ground.

Be able to discuss the subjects of interest to the farmer and stockman. Be able to discuss his problems with him -- not yours.

4. Know your theories.

The more progressive farmers know that scientific methods pay dividends and they look to us for knowledge on insect control. Give them the facts and let someone else speculate.

Fence Post Treatment

Holds Limelight in South Carolina

By W. C. Nettles
Clemson College, S. C.

Securing durable fence posts is quite a problem for every farmer in South Carolina, and agricultural workers in the State have manifested considerable interest in the methods of injecting trees developed by the Bureau of Entomology and Plant Quarantine at Asheville. The fence-post problem in South Carolina seems to be very well summed up in a statement made by a person interested in farm problems who paraphrased a portion from the Ancient Mariner as follows:

"Trees, trees everywhere.....but not a one for posts."

What he meant to say was, that durable posts of black locust, cedar, and cypress are becoming more difficult to obtain. One of the long-felt needs of South Carolina farmers has been a simple, cheap, and effective treatment for fence posts.

In June 1937, U. S. D. A. Bureau of Entomology and Plant Quarantine Circular, E-409, was released. Early in November, while studying new publications, I was impressed with the idea of injecting trees with chemicals to preserve them, especially in view of South Carolina's need for durable fence posts. On November 26, I wrote Dr. F. C. Craighead, in charge of the Division of Forest Insect Investigations, and in reply received an invitation to visit the laboratory located at Asheville, N. C. On December 13, I visited the laboratory, accompanied by Mr. E. C. Turner, terracing specialist of the Extension Service, and Mr. Adams, regional forester of the Soil Conservation Service.

In the meantime, I had discussed this matter with many agricultural workers at Clemson, and all of them were impressed. However, Mr. Turner thought that it might be possible to simplify the method somewhat by cutting the green poles and placing them in a solution of the preservative chemical. On the visit to Asheville Mr. Turner asked Dr. B. H. Wilford and Mr. R. J. Kowal quite a few questions relative to the possibilities of developing this method. (Any entomologist located in the Southeastern States would profit, I am sure, by a similar visit to the laboratory at Asheville.) A county agents' meeting was held in Columbia during the same week of our visit to Asheville, and the subject of a preservative treatment for fence posts was mentioned during the hour in which the extension entomologist discussed some trends in pest control.

During January of 1938, many of the recommended preservative methods were tried on a small scale on trees adjacent to the college, with the result that a news letter was issued which read in part as follows:

"That living trees, such as sap pine, for use as fence posts may be injected with chemicals to preserve them against insect injury or decay will

be demonstrated by the Extension Service of Clemson College, says County Agent _____, who states that chemical methods recently developed seem promising."

The South Carolina extension entomologist was requested to show the treated post obtained from Asheville and to discuss the possibilities of this method of treatment before the Joint Agricultural Committee of the South Carolina House and Senate on February 1, as a means of stimulating interest in teaching, research, and extension in forestry. Also appearing before the committee were: H. A. Smith, State forester; D. W. Watkins, director of extension; H. P. Cooper, dean of the school of agriculture and director of the experiment station; and E. W. Sikes, president of the college. Members of the committee were impressed, and, as a result, many method and result demonstrations are being requested.

Federal representatives, together with Mr. Turner, and Mr. Raymond Reed of the physics department, assisted the extension entomologist with a radio broadcast on the subject.

The preservation of trees to make durable fence posts is certainly a live issue in South Carolina because of the severe damage to posts by termites. Much interest has been aroused and there is every reason to believe that the demonstrations undertaken will be successful. There are a number of questions yet to be cleared up, and it is hoped that research workers will continue to press forward and give answers to these questions.

Michigan Livestock Insect Pest Calendar

By Mr. C. B. Dibble
Michigan

The livestock insect pest calendar was conceived for distribution to livestock insect pest control and eradication cooperators. The intention was to call the attention of the people in these groups to impending livestock pest problems, and to remind them of the practices suggested for meeting these problems. Each cooperator was furnished with a calendar in the livestock pest control project outline, but these were not always referred to at the proper time.

County agents' inquiries frequently indicate that their subject matter is not up to date on livestock insect pest problems, so the original list was enlarged to include this group. The contacts made with insecticide dealers in our training schools indicated an interest in the livestock angle and a woeful lack of working information for the intelligent merchandising of the better control materials. With the material prepared, it seemed logical to include this group if possible.

A mailing list was available for reaching about 350 insecticide dealers. This was compiled from a list of insecticide dealers attending training schools, and many county agents furnished the names of insecticide dealers in their respective counties.

The calendars intended for the organized livestock insect pest control and eradication group are sent to the county agents and mailed by them to their cooperators.

The total distribution of this material is at present about 450 copies of each issue. Addressograph lists are available so distribution costs very little. The 500 cards and their mimeographing probably costs less than $5 for each issue. Seven issues covering the 12 months were prepared, which makes the total cost for the year's service slightly less than $35 for over 3,000 contacts.

Several county agents expressed their interest in this endeavor, and one agent requested enough cards for distribution to box holders through the mail carriers. This would have required 2,500 cards and, we had to suggest, that they be mimeographed in the county. One weekly paper editor has requested that he be put on the mailing list to receive these cards.

The idea was so well accepted in general that we used a series of weekly card releases on garden and field crop insect problems through the summer when the releases of the livestock calendars were infrequent. These cards carried the conventional lightning sign in red ink and were called "Bug Flashes." These were also well-liked and found a variety of uses by recipients.

County agents kept them handy for quick reference and used them for news stories, radio talks, and as a sample for mail-outs within their county. Many insecticide dealers posted them conspicuously in their business places. The insecticide dealers mailing list is now in the process of being revised by a reply-card inquiry, and this work will be continued on the basis of the revised list to such people as specifically request a continuation of this service. In addition, a few names will be added from counties that are not receiving this service at the present time, if and when lists of interested insecticide dealers are submitted from these counties.

A Cabbage Maggot Problem Solved With Commercial Assistance

By C. B. Dibble
Michigan

The cabbage-maggot problem periodically becomes acute in Michigan. This happened in early cabbage in several sections in 1936, and growers suffered total losses in some cases. These decidedly noticeable losses were accompanied by a prevailing high price and considerable interest was aroused in cabbage-maggot control.

Attempted control with corrosive sublimate solution in large-scale operations failed to give satisfactory results and growers were easily interested in the tar-paper-disk method. The larger growers wanted to buy these ready cut, for various reasons, and asked for a source from which they could be obtained at a price comparable to hand-cut disks. No source at all was found in the available listings for some time. When a manufacturer was located who was able to supply this material, the price was higher than the commercial growers cared to pay, and a local source seemed desirable.

Costs figured by printers and paper handlers indicated that the methods of production permitted by their equipment were not efficient for such work. This led us to a machine shop and here we found equipment already in use which had sufficient strength and speed to promise economical production.

Through cooperation in directing the production of the disks and in encouraging the use of this method, the Robey Manufacturing Company in East Lansing was cajoled into the tar-paper-disk business.

Careful consideration of the material used and methods of handling enabled this company to sell tar-paper-disks in lots of 50,000 or more for 50 cents per thousand. This price was just half the price quoted for such quantities from the other source located, with comparable reductions on smaller quantity lots. Cooperative buying enabled many of the larger growers to buy at this 50,000 rate. Early buyings led us to hope that a million cabbages would be protected in 1937. The total sales fell somewhat short of this figure, but over three fourths of a million disks were sold. This represents protection for approximately 75 acres of cabbage, most of which was of the early commercial crop with a good price and in home gardens where relative values are always high.

Cost of Spring Treatments Through Delayed Dormant Stage*

F. Z. Hartzell

Treatment	Cost per tree			Cost per bushel		
	Materials	Application	Total	Materials	Application	Total
Dormant Treatments Followed by Lime-sulfur at Delayed-dormant						
Tar oil 2½ gallons Lime-sulfur 2 gallons	$ .18	$ .32	$ .50	$ .012	$ .021	$.033
Tar oil 4½ gallons Lime-sulfur 2 gallons	.31	.32	.63	.021	.021	.042
Tar-lub. oil 5½ gallons Lime-sulfur 2 gallons	.29	.32	.61	.019	.021	.040
DN-oil 2 gallons Lime-sulfur 2 gallons	.22	.32	.54	.015	.021	.036
DN-oil 3 gallons Lime-sulfur 2 gallons	.32	.32	.64	.021	.021	.042

Treatment	Cost per tree			Cost per bushel		
	Materials	Application	Total	Materials	Application	Total
Late Green-tip Treatments Including Bordeaux						
Lubricating oil 3 gals.+ bordeaux 2-4-100	$ .11	$ .21	$ .32	$ .007	$ .014	$.021
Lub. oil 3 gals.+ nic.1 pt.+ bordeaux 2-4-100	.26	.21	.47	.017	.014	.031
Lub. oil 3 gals.+ nic.2 pts.+ bordeaux 2-4-100	.41	.21	.62	.027	.014	.041
Delayed-dormant Treatments Including Fungicides						
Lub. oil + nic. and bordeaux	(same as for green-tip)					
Lime-sulfur 2 gals.+nic.1 pt.	.19	.21	.40	.012	.014	.026
Lime-sulfur 2 gals.+nic.2 pts.	.34	.21	.55	.022	.014	.036
Lime-sulfur 11 gals.+nic.1 pt.	.35	.21	.56	.023	.014	.037
Lime-sulfur 11 gals.+nic.2 pts.	.50	.21	.71	.033	.014	.047

*Cost per tree based on 15 gallons of insecticidal spray per tree yielding 15 bushels. The extra treatment of lime-sulfur following dormant applications is based on 7½ gallons of spray mixture per tree.

Cost of application (including labor, operations, etc.) $1.42 per 100 gallons.

Cost of spray materials:

Lime-sulfur per gallon 12 cents
Lubricating oil per gallon 17 cents
Tar oil (83 percent emulsion) per gallon 35 cents
Tar-lub. oil (83 percent emulsion) per gallon 27 cents
DN-oil per gallon 65 cents
Nicotine per pint $1.00
Copper sulfate per pound 6½ cents
Lime per pound 1 cent

F.Z. Hartzell
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Geneva, N. Y.

Feb. 21, 1938

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TIMELY TOPICS

Past the Million Mark

During 1936, more rural young people held membership in 4-H clubs than at any time in the history of cooperative extension work. Reports from county extension agents in 2,882 counties in the United States, Alaska, Hawaii, and Puerto Rico, showed that 1,145,508* rural young people were members of 68,341 4-H clubs. The increase over 1935 of 7,621 clubs and 147,764 members was due chiefly to the enlarged Extension Service staff. There were 536,895 boys and girls who joined 4-H clubs in 1936 for the first time. On the basis of new members enrolled in 1936, 4-H club work is reaching 44 percent of the rural boys and girls.

Control of Pea Weevil

"Rotenone dust appears to have given this summer a large-scale and convincing demonstration of its effectiveness in pea-weevil control," says the Washington Farmer (August 19). "Dr. Claude Wakeland, University of Idaho entomologist, who recently visited the large cannery pea-producing areas of eastern Washington and Oregon to study the results of rotenone dusting, says: 'Virtually no weevilly peas are coming into the canneries and both canners and growers are happy of the results.' This is the third year that rotenone dust has been used in pea-weevil control. It is the first season of such large-scale activities. The idea of employing this chemical came from Dr. T. A. Brindley, of the U. S. Bureau of Entomology and Plant Quarantine, stationed at the University of Idaho. For many years the Federal bureau, in cooperation with the Idaho, Washington, and Oregon experiment stations, has been searching for a solution to the Northwest's serious weevil problem. The first year rotenone was tried out on experiment plots. Results were so promising it was given a more extended field test last year. When the record of the 1936 dusting operations was reported to the canners, they immediately laid plans for the big dusting activities this year..."

Derris Versus Cube*

Is cube equal to derris as an insecticide?

Laboratory and field tests indicate that in the control of some insects derris gives better results than cube of the same rotenone content, whereas other insects appear equally susceptible to derris and cube.

The apparent superiority of derris over cube may be due to its finer particle size and to a higher rotenone content than is shown by analysis.

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*For complete statistical results of 4-H club work in 1936, see Extension Service Circular 266, Statistical Results of Cooperative Extension Work, 1936, U. S. Department of Agriculture, 52 pages, June 1937. (Mimeographed.)

*The discussion of a paper by Dr. R. C. Roark, appearing in the January 1938 issue of Soap.

All derris powder sold in the United States is domestically milled, whereas about one-half the cube is ground abroad. Exact comparisons are lacking, but it is believed that powders ground in the United States are in general finer than those ground abroad.

The rotenone in many samples of derris is difficult to extract, whereas the rotenone in cube is readily extracted. If a sample of derris contains more rotenone than is revealed by the methods of analysis heretofore used, it will show to advantage when compared with a sample of cube of supposedly equal rotenone content.

Additional tests with accurately analyzed cube and derris of the same particle size must be made against a number of species of insects before a final conclusion can be drawn as to their relative values.

From information now available, any insecticidal superiority of derris over cube is more than offset by the present difference in price, which is 11 or 12 cents a pound. One hundred and thirty-two pounds of powdered cube can be purchased for the price of 100 pounds of powdered derris of the same (5 percent) rotenone content. Moreover, the principal agricultural insect pests against which rotenone is used, such as the Mexican bean beetle, the pea aphid, and three species of cabbageworms, are as readily controlled by cube as by derris of equal rotenone content. At present prices more economical control of those insects susceptible to rotenone can be secured with cube than with derris.

"Dynamite" Spray for Apples

"...For those growers whose codling moth problem appears impossible of solution, we suggest the 'dynamite' spray as developed by Dr. W. S. Hough, Winchester Research Laboratory, Virginia Experiment Station," says the Southern Planter (February). "...The 'dynamite' spray contained 1 pint of nicotine sulphate, 4 quarts of a summer spray oil and 3 pounds of arsenate of lead per 100 gallons of spray. The 'dynamite' spray was checked against a regular spray program followed by orchardists around Winchester and against unsprayed trees. In commenting on his spray, Dr. Hough said: 'This is the most effective combination that we have yet used against the codling moth. It is a triple-acting spray. The nicotine kills codling moths occurring in trees at the time of spraying and it also has some egg-killing action. Summer oil was included for its action on the eggs, and lead arsenate to poison the young worms. For the past two seasons we have used such a triple-acting combination in an attempt to eradicate the first brood in May and June and omitted spraying for the second brood in July and August...According to our tests, an average of not less than 72 percent of the moths in the trees at the time of spraying can be killed by the nicotine, while the oil will kill from 85 to 95 percent of the eggs. Due to the high cost of the ingredients, such a spray combination cannot be used generally, but may be practical where the codling moth is very difficult to control.'..." (James Marshall of the State of Washington has also prepared a dynamite spray that contains no nicotine but consists primarily of building up the arsenate of lead deposit. In referring to dynamite sprays, it should be made clear whether reference is made to Dr.Hough's spray or that of Mr. Marshall.)

Oil Spray for Apple

Efforts put forth by spray specialists at the State Experiment Station at Geneva, N. Y., to develop a single spray to be applied as a dormant treatment which would control with one application such pests as rosy aphid, budmoth, oyster-shell scale, San Jose scale and scurfy scale have met with success in the use of certain coal tar oil sprays and with petroleum oil containing a chemical known as dinitro-ortho-cyclo-hexyl-phenol, commonly called "DN" oil. (Better Fruit, March.)

Plant Viruses

The Lancet (April 3, 1937) includes a special article on Plant Viruses and Their Relation to Those Affecting Man and Animal, by Redcliffe N. Salaman, director of Potato Virus Research Station, University of Cambridge. His concluding paragraph says: "Although the incidence of virus disease in our field and crops and glasshouses has undoubtedly increased, there is no reason for undue pessimism. What is needed is more research on virus diseases and a closer understanding between the pathologist and the plant breeder. It is the latter who needs to realize that when by his breeding methods he gives us large and ever larger crops, bigger and whiter fruits, and the like, he has almost certainly discarded en route a number of hereditary genes which alone or in combination with others may be responsible for that vague but important character--constitution."

Dutch Elm Disease in England

"The report of the forestry commissioners on the Dutch elm disease for 1937 has recently been made public," says an editorial in Country Life (London, March 12). "The disease appears to be making little headway; but, on the other hand, the commissioners are of the opinion that, if the conditions are favourable to its spread, a serious attack may be anticipated during the current year. Little knowledge is available regarding the climatic conditions which favor the spread of the fungus, but it is now definitely recognized that the bark beetle is the chief agent of infection, and it would seem that scientific research should direct its line of attack against the beetle to check the spread of the disease. It is disappointing to read that 'the disease is too extensive in England to allow of its eradication being considered as a practicable measure,' and to learn that the commissioners still discourage the planting of elms in England and Wales unless they are used in a mixed plantation. A great deal of work has been carried out recently on the relative resistance to attack of the various species of elms, and, while complete immunity seems as far removed as ever, it is encouraging to note that some strains have been raised that, so far, have proved quite resistant, and can be recommended to prospective planters."

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